

CLAIMS

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1. A low profile antenna structure, **characterized in that** it comprises a first metallic patch (210) and a second metallic patch (240) stacked over a ground plane (200), the first patch comprising a circumference along a patch edge (212) of the first patch, the second patch comprising a circumference along a patch edge (242) of the second patch, the first patch being arranged between the ground plane and the second patch, the first patch being grounded at at least a first zero potential area (226) by electrical connection (224) with the ground plane and a second zero potential area (236) by electrical connection (234) with the ground plane and being fed at a single feed area (219), the second patch being electrically interconnected (254, 264) to the first patch, and the first patch comprises at least a first aperture (220) and a second aperture (230) located completely within the circumference of the first patch to thereby force current propagating from the feed area to the first zero potential area and the second zero potential area, toward the patch edge of the first patch to thereby enable radiation from slots (214, 216, 244, 246) defined by the edge of the first patch and the edge of the second patch and the ground plane.

2. A low profile antenna structure, **characterized in that** it comprises a first metallic patch (210, 310, 410, 510) and a second metallic patch (240, 481, 482) stacked over the first patch, the patches being intended to be mounted over a ground plane (200, 400), the first patch comprising a circumference along a patch edge (212, 312) of the first patch, the second patch comprising a circumference along a patch edge (242) of the second patch, the first patch being arranged between the ground plane and the second patch, the first patch comprising a first zero potential area (226, 326, 526) by connection (224, 324, 424, 524) with the ground plane and a second

zero potential area (236, 336, 536) by connection (234, 334, 434, 534) with the ground plane, the second patch being electrically interconnected (254, 264, 354, 364, 454, 464) to the first patch, and the antenna being fed at a single feed area (219, 319, 419, 519) comprised on the first patch, and the
5 first patch comprises at least a first aperture (220, 320, 420, 520) and a second aperture (230, 330, 430, 530) located completely within the circumference of the first patch to thereby force current, propagating from the feed area to the first zero potential area and the second zero potential area, toward the patch edge of the first patch to thereby enable radiation from slots
10 (214, 216, 244, 246, 315, 317) defined by the edge of the first patch and the edge of the second patch and the ground plane.

3. The antenna structure according to claim 2, **characterized in that** the first aperture (220, 320, 420, 520) and the second aperture (230, 330, 430, 530) are located on the first patch (210, 310, 410, 510) in such a way that
15 current propagating from the feed area (219, 319, 419, 519) to the first zero potential area (226, 326, 526) propagates in two different paths (327, 328) around the first aperture and that current propagating from the feed area to the second zero potential area (236, 336, 536) propagates in two different
20 paths (337, 338) around the second aperture.

4. The antenna structure according to claim 2 or 3, **characterized in that** the first aperture is located between the feed area and the first zero potential area, and in that the second aperture is located between the feed area and
25 the second zero potential area.

5. The antenna structure according to any one of claims 2 to 4, **characterized in that** the second patch is electrically interconnected to the first patch at at least the first zero potential area and the second zero
30 potential area.

6. The antenna structure according to any one of claims 2 to 5, **characterized in that** the first aperture and the second aperture each have an extension which is substantially perpendicular to a line between the first zero potential area and the second zero potential area.
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7. The antenna structure according to any one of claims 2 to 6, **characterized in that** there is a symmetry of the first patch about a line between the first zero potential area and the second zero potential area.
- 10 8. The antenna structure according to any one of claims 2 to 7, **characterized in that** there is a symmetry of the first patch about a line perpendicular to a line between the first zero potential area and the second zero potential area.
- 15 9. The antenna structure according to any one of claims 2 to 8, **characterized in that** the second patch comprises no openings within its circumference.
- 20 10. The antenna structure according to any one of claims 2 to 8, **characterized in that** the second patch comprises at least one opening within its circumference.
- 25 11. The antenna structure according to any one of claims 2 to 8, **characterized in that** the second patch is electrically split into two halves along a line which is substantially perpendicular to a line between the first zero potential area and the second zero potential area.
- 30 12. The antenna structure according to any one of claims 2 to 11, **characterized in that** the second patch at least covers the first aperture and the second aperture of the first patch.

13. The antenna structure according to any one of claims 2 to 12,
characterized in that the first patch comprises further apertures.
14. The antenna structure according to any one of claims 2 to 13,
5 **characterized in that** the first patch and the second patch are substantially
of the same size.
15. The antenna structure according to any one of claims 2 to 14,
characterized in that the first patch, in addition to the first aperture and the
10 second aperture, comprises further apertures.
16. The antenna structure according to any one of claims 2 to 15,
characterized in that the antenna structure comprises the ground plane.
- 15 17. The antenna structure according to claim 16, **characterized in that** the
ground plane is substantially of the same size as the first patch and the
second patch.
18. The antenna structure according to any one of claims 2 to 17,
20 **characterized in that** the electrical connections from the first patch to the
ground plane and the electrical interconnections between the first patch and
the second patch, in addition to providing the antenna structure with electrical
connections also provides the antenna with mechanical support giving the
antenna a self supporting structure.
- 25 19. The antenna structure according to any one of claims 2 to 17,
characterized in that the first patch is supported by a first dielectric and in
that the second patch is supported by a second dielectric, the first dielectric
and the second dielectric further providing the antenna with mechanical
30 support giving the antenna a self supporting structure.

20. The antenna structure according to any one of claims 16 to 17,
characterized in that the first patch is supported by a first dielectric and in
that the second patch is between the first dielectric and a second dielectric
and in that the ground plane is supported by the second dielectric, the first
5 dielectric and the second dielectric further providing the antenna with
mechanical support giving the antenna a self supporting structure.

21. The antenna structure according to any one of claims 2 to 20,
characterized in that the single feed area is probe fed at one point.

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22. The antenna structure according to claim 21, **characterized in that** the
single feed area further comprises inductive feed matching.

23. The antenna structure according to any one of claims 2 to 20,
15 **characterized in that** the single feed area is probe fed at a plurality of
points.

24. The antenna structure according to claim 23, **characterized in that** the
plurality of points are placed in the feed area along a limited line that if
20 extended would pass through the first zero potential area and the second
zero potential area.

25. The antenna structure according to any one of claims 23 to 24,
characterized in that the plurality of points are placed in the feed area
25 symmetrically about a line that passes through the first zero potential area
and the second zero potential area.

26. The antenna structure according to any one of claims 2 to 20,
characterized in that the single feed area is fed by an aperture coupling.

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27. A device comprising wireless communication means, **characterized in
that** the device comprises an antenna according to any one of claims 1 to 26.

28. A wireless mobile terminal, **characterized in that** the terminal comprises an antenna according to any one of claims 1 to 26 for wireless communication.

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29. A personal computer card suitable for insertion into an electronic device, **characterized in that** the card comprises an antenna according to any one of claims 1 to 26.

- 10 30. A wireless local area network system comprising a base station and a plurality of terminals which are in wireless communication with the base station, **characterized in that** at least one terminal comprises either directly or indirectly an antenna according to any one of claims 1 to 26.

2006.1.19. 03.00